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Supporting self-management for people with hypertension: A meta-review of quantitative and qualitative systematic reviews

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Abstract:	Objectives: Globally, healthcare policy promotes supported self-management as a strategy for people with long-term conditions. This meta-review aimed to explore how people with hypertension make sense of their condition, to assess the effectiveness of supported self-management in hypertension, and to identify effective components of support. Methods: From a search of eight databases (Jan 1993-Oct 2012; update June 2017) we included systematic syntheses of qualitative studies of patients' experiences, and systematic reviews of randomised controlled trials evaluating the impact of supported self-management on blood pressure and medication adherence. We used meta-ethnography, meta-Forrest plots and narrative analysis to synthesise the data. Results: Six qualitative and 29 quantitative reviews provided data from 98 and 446 unique studies, respectively. Self-management support consistently reduced systolic BP (by between 2 and 6mmHg), and diastolic BP (by between 1 and 5mmHg). Information about hypertension and treatment, home BP monitoring (HBPM) and feedback (including telehealth) were widely used in effective interventions. Patients' perceptions of a disease with multiple symptoms contrasted with the professional view of an asymptomatic condition. HBPM, in the context of a supportive patient-professional relationship, changed perceptions of the significance of symptoms and

	fostered confidence in ability to self-manage hypertension. Conclusions: Our systematic qualitative and quantitative meta-reviews tell complementary stories. Supported self-management can improve blood pressure control. Interventions are complex and encompass a broad range of support strategies. HBPM (with or without telehealth) within the context of a supportive patient-professional partnership can bridge the gap between medical and lay perspectives of hypertension and enable effective self-management.

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14th April 2018

Dear Professor Zanchetti,

Supporting self-management for people with hypertension: A meta-review of quantitative and qualitative systematic reviews

We have pleasure in submitting our paper which synthesises the findings of 446 randomised controlled trials with the insights from 98 qualitative studies, providing a comprehensive overview of the current literature on supported self-management for people with hypertension.

Our meta-review resonates with the recent Lancet Commission on hypertension which calls for 'RCTs to assess the effectiveness of empowering patients to take control'.[1] Our quantitative meta-review demonstrates that supported self-management for hypertension has consistently been shown to reduce systolic and diastolic blood pressure. Echoing the Commission's call for 'sustained education using new technologies', we found that home BP monitoring (HBPM) with feedback (including telehealth) was a common strategy in effective trials.

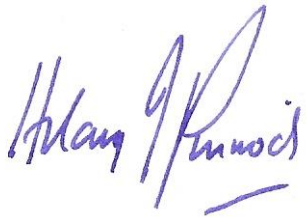
Our qualitative synthesis provides insight into why this is an important approach. In direct contrast to the professional view of hypertension as an asymptomatic condition, patients attributed multiple symptoms to their blood pressure. This influenced adherence as they adjusted the necessity for treatment according to their symptoms. By enabling patients to adopt the 'clinical' approach of measuring blood pressure, HBPM (if supported by professionals) changed understanding hypertension and empowered them to engage in self-management.

We thus believe our metareview will inform clinicians, policy-makers, commissioners and providers of healthcare services as they consider if/how they should adopt the recommendations of the Lancet Commission on provision of supported self-management.

The original PRISMS (Practical systematic Review of Self-Management Support for long-term conditions) project, funded by the UK's National Institute of Health Research, is published as a final report in NIHR *Health Service and Delivery Research*,[2,] and abstracts were presented at three conferences in 2013/2014.[3] The PRISMS report, however, covers self-management in a range of long-term conditions, and does not include the updated searches that we undertook for this paper (which more the doubled the included evidence and substantially changed the conclusions). Our updated metareview, as submitted to the *Journal of Hypertension*, is thus novel and has not been previously published or presented.

Thank you for considering our manuscript. We hope you enjoy the paper and look forward to your decision in due course.

Yours sincerely,



Professor Hilary Pinnock

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Supporting self-management for people with hypertension: A meta-review of quantitative and qualitative systematic reviews

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Conflicts of interest: NONE to declare

Previous presentations of the whole or part of this work:

- The final report of PRISMS review (including the original hypertension meta-review, but not the update, is published): Taylor SJC, Pinnock H, Epiphaniou E, Pearce G, Parke H, *et al.* A rapid synthesis of the evidence on interventions supporting self-management for people with long-term conditions. *Health Serv Deliv Res* 2014; 2:54
- Abstracts of the original hypertension meta-review have been presented at the Public Health Science Conference, November 19th 2014, Glasgow (by AS); Division of Health Psychology Annual Conference, September 10th 2014, York (by GP); and Society for Academic Primary Care Conference, July 3rd 2013, Nottingham (by AS)

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Abstract

Objectives: Globally, healthcare policy promotes supported self-management as a strategy for people with long-term conditions. This meta-review aimed to explore how people with hypertension make sense of their condition, to assess the effectiveness of supported self-management in hypertension, and to identify effective components of support.

Methods: From a search of eight databases (Jan 1993-Oct 2012; update June 2017) we included systematic syntheses of qualitative studies of patients' experiences, and systematic reviews of randomised controlled trials evaluating the impact of supported self-management on blood pressure and medication adherence. We used meta-ethnography, meta-Forrest plots and narrative analysis to synthesise the data.

Results: Six qualitative and 29 quantitative reviews provided data from 98 and 446 unique studies, respectively. Self-management support consistently reduced systolic BP (by between 2 and 6mmHg), and diastolic BP (by between 1 and 5mmHg). Information about hypertension and treatment, home BP monitoring (HBPM) and feedback (including telehealth) were widely used in effective interventions. Patients' perceptions of a disease with multiple symptoms contrasted with the professional view of an asymptomatic condition. HBPM, in the context of a supportive patient-professional relationship, changed perceptions of the significance of symptoms and fostered confidence in ability to self-manage hypertension.

Conclusions: Our systematic qualitative and quantitative meta-reviews tell complementary stories. Supported self-management can improve blood pressure

control. Interventions are complex and encompass a broad range of support strategies. HBPM (with or without telehealth) within the context of a supportive patient-professional partnership can bridge the gap between medical and lay perspectives of hypertension and enable effective self-management.

Key words

Hypertension; supported self-management; home blood pressure monitoring; telehealth; systematic meta-review; systematic review; meta-analysis; qualitative synthesis;

Condensed Abstract

Our meta-review synthesised the findings of 6 qualitative (98 studies) and 29 quantitative (446 Randomised Controlled Trials) reviews. Self-management support for hypertension consistently reduced blood pressure. Interventions are complex, encompassing support strategies such as information about hypertension/treatment, home BP monitoring (HBPM) and feedback (including telehealth). Patients' perceptions of a disease with multiple symptoms contrasted with the professional view of an asymptomatic condition. HBPM, in the context of a supportive patient-professional relationship, increased patients' understanding of hypertension, potentially bridging the gap between medical and lay perspectives of hypertension and enabling effective self-management.

Abbreviations definitions

BP	Blood pressure
HBPM	Home blood pressure monitoring
LTCs	Long-term conditions
MeSH	Medical subject headings
PICOS	Population, Intervention, Comparator, Outcome, Setting
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PRISMS	Practical systematic Review of Self-Management Support for long-term conditions
RCTs	Randomised Controlled Trials
R-AMSTAR	Revised Assessment of Multiple Systematic Reviews

Introduction

Hypertension is an important public health problem globally, with an estimated 1.56 billion adults predicted to have the disease by 2025 [1]. As a major risk factor for renal failure, ischaemic heart disease, stroke, and other cardiovascular diseases[1], poorly controlled hypertension contributes to substantial morbidity and mortality. Ischaemic heart disease and stroke were leading causes of death globally in 2010 [2] and predicted to remain so in 2030 [3]. This represents a large, and increasing, burden of potentially preventable and treatable disease and one that, alongside other long-term conditions (LTCs), healthcare systems around the world need to address[1].

One response to the mounting global challenge of managing LTCs, is the promotion of supported self-management[4-6], with a shift from paternalistic to partnership models of care[7]. Self-management has been defined as *'..the tasks that individuals must undertake to live with one or more chronic conditions'* and includes having the *'confidence to deal with medical management, role management and emotional management of their conditions'*[8]. A broad range of strategies have been used to meet the support needs of people living with LTCs[9,10]. Some strategies are common to all conditions (such as provision of information and professional support) whilst others will be specific to diverse conditions or contexts. For example, variable conditions such as asthma benefit from provision of 'action plans' to support timely self-management of attacks[11]; whereas therapy rehabilitation and psychosocial support are more important for people living with the disabling but stable impact of a stroke[12,13]. The evidence for self-management support for hypertension, an asymptomatic condition in which the key objective is reducing the risk of complications

[1,14] is less clear, though there is increasing interest in promoting lifestyle change and the role of telehealth to monitor blood pressure[14].

As part of a large systematic meta-review of the literature completed in 2013 on self-management support for LTCs (PRISMS - Practical systematic Review of Self-Management Support for long-term conditions)[15], we synthesised the evidence around self-management support interventions for people with hypertension; this paper reports an update undertaken in 2017. Meta-reviews provide broad perspectives, ideal for informing policy-makers, commissioners and providers of healthcare services[16]. We reviewed qualitative systematic reviews to explore how people with hypertension make sense of their condition and understand self-management strategies, and quantitative systematic reviews to identify which self-management support interventions are effective.

Methods

This update followed the methods used in the PRISMS meta-review[15], which was based on Cochrane methodology[17]. (The study could not be registered because PROSPERO does not register meta-reviews)

Search strategy: We used a 'PICOS' search strategy, with basic search terms of 'self-management support' AND 'hypertension' AND 'systematic review'. The full search protocol, search terms and MeSH terms are available in Supplementary Digital Content (SDC) file 1. The original PRISMS search was from January 1993 (when systematic review methodology was defined by the Cochrane collaboration) until October 2012; the update search was undertaken in June 2017. We searched eight electronic databases: MEDLINE, EMBASE, CINAHL, PsychINFO, AMED, BNI, Cochrane Database of Systematic Reviews and Database of Abstracts of Reviews of Effects, checked the bibliographies of eligible reviews and undertook a forward citation search (Web of Science).

Screening and selection criteria: Following training, title and abstract screening was carried out by AS or GP/EE (PRISMS review) and OS (Update). Full text screening was then performed by AS (PRISMS) and OS/DD (Update). At all stages of screening, a random 10% sample of titles were independently examined by GP/EE (PRISMS review) and GP/AS (Update), as a quality check. Discussion with SJCT/HP resolved disagreements.

Population: We included studies from all healthcare settings where self-management support was delivered to populations with diagnosed hypertension, with no exclusions

made for age, gender, or ethnicity. Reviews were excluded when they focussed solely on secondary hypertension, children or pregnant women because we considered that they might not be representative of the general supported self-management of hypertension.

Intervention: We included quantitative systematic reviews if they searched for interventions that met our definition of self-management support[8]. We excluded reviews focussing solely on mono-component interventions (such as meditation, relaxation, exercise), other than interventions described as providing only 'education' which we regarded as an essential component of supported self-management[15]. We included qualitative reviews which informed strategies to support self-management (including general experiences of living with hypertension and using hypertension services).

Comparator: All comparators (typically 'usual care') were included; we noted details of the control service in our analysis.

Outcomes: Our primary clinical outcome was mean difference in blood pressure (systolic and diastolic) and, reflecting the mechanism by which hypertension is controlled, adherence to medication was the key process outcome.

Study design: We included quantitative systematic reviews of Randomised Controlled Trials (RCTs) or mixed method reviews in which the RCT data could be extracted. Qualitative systematic reviews were included if they provided a synthesis of qualitative primary studies. We excluded reviews that were unpublished, if they were not in

English, if we were unable to extract data about people with hypertension, or if a more recent updated version had been published. See SDC file 1 for detailed exclusion criteria.

Data extraction and quality assessment: Data were extracted by AS/GP (PRISMS review), OJ/DD (Update) using a piloted data extraction table; 10% of the completed data extraction tables were checked by a second reviewer (GP/HLP for PRISMS; GP/AS for the update). All numerical data in tables or figures were checked by HP prior to publication.

We used the Revised Assessment of Multiple Systematic Reviews (R-AMSTAR) quality appraisal tool to assess the quality of all included systematic reviews[18].

- For qualitative reviews, an adapted R-AMSTAR was used with high quality defined as those scoring of ≥ 30 (out of possible R-AMSTAR score of 40) and low quality if < 30.
- For quantitative reviews, we applied a weighting system, taking into consideration both the quality score (high quality, defined as a score of ≥31 (out of possible R-AMSTAR score of 44) or low quality, a score <31) and number of participants (large ≥3,000 or small <3,000). Studies were rated from 1 star (small, low-quality reviews) to 3 stars (large, high-quality reviews). Small, high-quality or large, low-quality reviews were rated 2-star. Assessments of publication bias in the include reviews was noted.

Quality assessment was undertaken by AS or GP (PRISMS) and OJ or DD (Update), with a random 10% checked independently by a second reviewer (HLP/GP for

PRISMS; GP/AS for update). Disagreements were resolved by discussion and, if necessary, with the involvement of a third reviewer (HP/SJT/EE).

Data synthesis: Initially, data from the included quantitative and qualitative reviews were analysed and synthesised separately.

- We employed a meta-ethnographic framework to synthesise the qualitative review data (GP/DD building on initial work by AS)[19]. Reciprocal translation was first used to examine patterns and identify metaphors arising within the included reviews. A lines-of-argument synthesis then interpreted the findings into a broader understanding to inform future development of self-management support interventions in a healthcare context[19].
- For the quantitative analysis (AS/OS) we performed a narrative synthesis (overlap of included RCTs between reviews precludes meta-analysis), using the PRISMS taxonomy to categorise components of self-management support[9]. We illustrated the results of included meta-analyses in meta-Forrest plots.

Synthesis of the data from the quantitative and qualitative reviews involved discussion amongst the multidisciplinary study team to ensure balanced interpretation.

Pre-publication check

We undertook a pre-publication check in April 2018 using the ‘efficient and effective’ approach of forward citation of all included reviews using Google Scholar[20]. We undertook focused data extraction of key outcomes (HP checked by GP) which we cite as corroborative data. Had we identified studies that substantially changed our conclusions we planned full duplicate data extraction, quality assessment and revision of our synthesis.

Results

The screening process is illustrated in the PRISMA flow diagram (Figure 1). The PRISMS meta-review identified 11,098 references from which two qualitative and ten quantitative systematic reviews were selected. The update search yielded 13,055 citations from which we selected an additional four qualitative and 19 quantitative reviews.

Review characteristics

Details of all included studies are in summary tables SDC2 (qualitative) and SDC3 (quantitative) with quality scores and quantitative star ratings in column 1. SDC file 1 has details of the R-AMSTAR scores and tables summarising the degree of overlap between the studies included in the reviews.

The six qualitative systematic reviews (2007 to 2017)[21-26], reported 98 unique primary qualitative studies, published between 1980 and 2015, and undertaken in at least 27 countries. Three reviews were scored as being of high quality[23-25].

The 29 quantitative systematic reviews[27-56], were published between 1998 [35] and 2017 [27,34,48], included 446 unique RCTs dating from 1973 to 2016, and were conducted in at least 12 different countries including high- middle- and low- income settings. Total numbers of participants in the RCTs, where reported, ranged from 382 to more than 87,000 [36]. Fourteen reviews undertook meta-analyses of blood pressure data[30,31,33-36,39,41,43,47,48,51,53,55]; the remainder presented narrative synthesis only. The R-AMSTAR scores ranged from 18 [32] to 41 [48] with

seven reviews allocated 3-star ratings[30,34,36,39,43,48,50]. We identified two additional quantitative reviews in the pre-publication check[56,57].

Overview of results

We first describe the qualitative findings which explore patients' *understanding of hypertension* and perceptions of *working together* with healthcare professionals to manage the condition. We then present the findings of the quantitative systematic reviews which assess the impact of different self-management support strategies on BP control and medication adherence. Finally, we present an over-arching synthesis of the findings of the qualitative and quantitative meta-reviews.

Synthesis of qualitative findings

We identified two overarching metaphors (Figure 2): 'Understanding Hypertension' and 'Working Together'. See SDC file 2 for a summary table of qualitative reviews and illustrative quotes to support these metaphors and the sub-themes.

Understanding hypertension

People with hypertension reported a wide variety of factors contributing to their experience and understanding of the condition. A range of beliefs about the definition and causes of hypertension, influenced by cultural factors[21,24,26], were identified, including that it was a 'temporary' condition that was not serious[21,24,26],or being two distinct conditions: '*high-pertension'*, resulting from intense emotions or anxiety, and '*high blood'*, a chronic condition due to genetics and diet[21]. Stress (for example financial or family problems, racism and stressful life events) was commonly believed

to cause/worsen hypertension[21,23,24,26]. Diet, such as high salt intake, was also recognised by many as a cause[21,23,26]. Participants frequently described a range of different symptoms associated with high blood pressure, and in particular headache and dizziness[21,24,26]. Most clinicians believe hypertension is symptomless, and therefore the presence of symptoms provided a source of confusion to patients[23].

How people manage their hypertension, and particularly medication adherence**,** was influenced by a range of factors. Deliberately choosing to avoid or reduce medication (intentional non-adherence), rather than forgetfulness, was a theme in some studies[24]. For some patients, symptoms acted as a guide for the seriousness of their hypertension and guided their medication use; for example, they stopped treatment if symptoms disappeared[22-24,26]. Some were guided by stress, using medication to manage worry or anxiety rather than hypertension[24,26]. For others, fear of dependency affected the amount of medication they took[24]. A range of individual and social factors including; familial (lack of support, need for separate meals), and environmental (sense of security, local amenities, healthy food availability) were identified as challenges to treatment adherence[23]. Financial status[23,26], and logistical issues (frequency of appointments, work schedules, accessibility)[23], also posed challenges to self-management.

Working together

The impact of the patient-professional relationship on (self-)management of hypertension, and the influence of home blood pressure monitoring (HBPM) was highlighted. People with hypertension valued individualised targeted treatment that took account of their circumstances[22]. Differences between clinicians' and patients'

beliefs were potential sources of confusion and mistrust[22,23,25,26], and were related to both cultural and individual beliefs[21,23,26]. These included differences about perceptions of symptoms, disease management, and treatment expectations[22]. More adherent patients tended to describe their healthcare professional as caring and listening, and the relationship as a partnership with joint goal setting and holding individuals accountable for their behaviour[26].

Ambiguity about management and prognosis emerged across studies[22-24,26], with the importance of information clarity identified. Fear for the future was reported, including ability to manage physically and afford care[23]. Tailored management plans with more information regarding risk factors, prevention, management, and complications of hypertension, as well as group sessions with information about hypertension and diet were frequently requested[23].

Self-monitoring of BP could foster a therapeutic alliance[22], specifically changing perceptions of the significance of symptoms and fostering a sense of self-control, motivation, and increased confidence in managing hypertension[22,25]. Patients perceived HBPM as allowing more accurate and regular monitoring than healthcare professionals could provide[22,25], though some perceived that clinicians were negative about HBPM[22,23,25]. Concern about technical skills, differences between home and clinic measurements, and uncertainty interpreting and acting upon measurements could be problematic[22,23,25], echoing the importance of clarity with treatment advice and information.

Synthesis of quantitative findings

The quantitative analysis summarises the impact of supported self-management on BP control, identifies the support components employed mapped to the PRISMS taxonomy[9], and the evidence of effectiveness for the commonest components (information, monitoring with feedback, strategies to improve adherence, support for lifestyle change). See SDC file 3 for the summary table and mapping to the PRISMS taxonomy[13].

Impact of supported self-management on BP control

The impact of supported self-management on systolic and diastolic BP is illustrated in a meta-Forest plot (Figure 3). The results of the 11 meta-analyses (five 3*; five 2*; one 1*) that presented the results as mean differences suggest that provision of self-management support reduces systolic BP by between 2 and 6 mmHg, and diastolic BP by between 1 and 5 mmHg[30,31,33-36,39,41,43,47,55]. The two outliers with considerably greater effect sizes (Lu 2012[39] and Xu 2014[55]) included only trials conducted in China where 'usual care' may be different to other healthcare contexts. Nine of the 14 reviews (one 3*; seven 2*; five 1*) using a narrative synthesis reported positive impact on BP in the majority of their included RCTs[32,37,40,42,4446,49,51].

Components of self-management support

SDC file 3 shows the interventions described in the systematic reviews mapped to the components of the PRISMS taxonomy of self-management support[9] and illustrates the frequency with which they are encountered in self-management support interventions. Almost all components of the PRISMS taxonomy were reported in one or more of the hypertension self-management support interventions, most commonly *Education (A1); Monitoring with feedback (A5); Provision of equipment (A6); Lifestyle*

change (A14); Regular review (A4) and Access to professional support when needed (A7). The only components not featured were *Training/rehearsal to communicate with healthcare professionals (A9)* and *Training/rehearsal for everyday activities (A10).*

Effectiveness of specific components

The effect of interventions including the commoner components is described below:

- "*Information about hypertension and its management*" was a substantial component of self-management support in all but two interventions. The exceptions were reviews of dietary recommendations[47] or lifestyle interventions[33] for people with hypertension, but which did not specify provision of disease-specific information. The content and mode of delivery varied. Although 'education alone' was generally ineffective[35,36,50], strategies including tailoring of information[34,38,48,52], interactive group education sessions[39,45,55], linking with HBPM[35,36], or behavioural strategies[50] could improve outcomes.
- *Monitoring of blood pressure with feedback* was a feature of self-management support in 17 out of 29 reviews, though the monitoring process varied. Home BP monitoring[28,31,35,36,42,46,48,50], was often mediated by telehealth[27,29,32,34,37,41,43,52,53], and in some reviews also included monitoring of medication intake, weight, physical activity and smoking[40,52]. The impact of monitoring on blood pressure control varied, with evidence that monitoring associated with feedback from healthcare professionals (including via telehealth) or as part of a complex intervention to promote medication adherence was more likely to be effective than self-monitoring as an unsupported intervention[27,31,34,42]. An individual patient data meta-analysis identified in the pre-publication check similarly showed HBPM worked best when combined with

more intensive self-management interventions but had little or no effect on its own[56].

- *Practical help with adherence* encompassed a range of strategies (reminders, packaging, scheduling of appointments, regime simplification) with no one approach being consistently effective. In 9 out of 14 interventions this component had no effect or a small effect of doubtful clinical significance[27,28,35,38,40,42,43,50,51]. Interventions tailored to the specific needs of the target group (e.g. African American communities[48]) or delivered within the context of case-management[54] or supported by HPBP[57] may be effective.
- *Lifestyle advice and support* was included in 13 reviews and was the focus of investigation in one review[33], which concluded that when lifestyle advice and support is included within a complex intervention, it can have an impact on reducing BP.

Over-arching synthesis

Table 1 uses the PRISMS taxonomy of self-management support[9] to map insights from the qualitative lines-of-argument synthesis and components of the interventions reported in the quantitative systematic review. Central to these themes is the potential barrier of discordant beliefs between patients and their clinicians, and the need to address these beliefs within the context of a supportive therapeutic relationship. A specific intervention, which was perceived to have influenced this relationship, is the introduction of HPBM[22]. Six of the effective interventions illustrated in the meta-Forrest plot (Figure 3)[31,34-36,41,43], included HBPM (three mediated via telehealth)[34,41,43].

Discussion

Summary of main findings

Our meta-review summarises the findings of six qualitative syntheses (98 unique qualitative studies) and 29 systematic reviews (446 unique RCTs). Overall, there was consistent evidence (from 11 meta-analyses and 9 narrative reviews) that self-management for hypertension reduces systolic and diastolic BP. Interventions targeted most of the 14 components of supported self-management described in the PRISMS taxonomy, with 'information about hypertension and treatment', and 'home monitoring and feedback (including telehealth)' being widely used in effective interventions. Strategies to improve adherence, and lifestyle interventions could be effective if individually tailored and delivered in the context of complex interventions.

The qualitative meta-review highlighted conflicting health beliefs between people with hypertension, who considered stress to be an important cause of hypertension and attributed a range of symptoms to high blood pressure, and health professionals who considered hypertension to be an asymptomatic physical condition. Strategies suggested to bridge this gap included identifying individual and cultural beliefs, provision of tailored information, and supported use of HBPM, which enables people to increase their understanding and awareness of their condition. The success of these strategies was strongly influenced by a collaborative relationship between patient and professional.

Strengths and limitations

Using robust methodology, this meta-review is the first to synthesise both qualitative and quantitative evidence on supported self-management hypertension. Meta-

reviews facilitate synthesis of a very broad literature (we included evidence from 452 studies) but have some inherent limitations. Data are not extracted from the individual RCTs or qualitative studies, so we were reliant upon the detail and accuracy provided by the systematic review authors. This enables a high-level overview of the literature in the field (ideal for informing policy and healthcare service development) but re-synthesis of material already synthesised risks loss of granularity. In addition, studies are only included if they have been included in a systematic review, which imposes a delay, though our update and pre-publication check included reviews published in 2017 and papers as recent as 2016.

We applied our definition of self-management support to be consistent and inclusive across the literature[8], and included interventions that empowered the patient to take decisions about their management. This explicitly included education in the context of interventions supporting people to cope with the medical, emotional and role challenges of living with hypertension. However, in the context of hypertension, the terminology of 'supported self-management' is not widely used, and we may have missed some papers. The reviews included studies reporting complex interventions, and limited descriptions may mean that we have overlooked some components relevant to the PRISMS taxonomy. We did, however, include data about individual studies from the review tables and included all relevant details. Our training, quality check and multi-disciplinary team approach reduced the potential subjectivity of these decisions. Of the nine reviews reporting publication bias, only five considered that there may have been some bias[31,39,48,53,55].

Interpretation of findings in relation to previously published work

In LTCs with a well-established evidence base for supported self-management, such as asthma[11,58], disease presence and severity can be monitored by the presence or absence of symptoms. As an asymptomatic condition[14], hypertension has traditionally been managed by clinicians measuring blood pressure at intervals. This has limited patients to passively complying with the clinicians' instructions. The findings of our qualitative meta-review, however, challenge this medical viewpoint, as patients perceive symptoms which confirm (or not) the presence of high blood pressure and which some people described using to monitor their treatment regimes[22-24,26].

The recent Lancet Commission on hypertension identifies 'sustained education using new technologies' as a key action and calls for 'RCTs to assess the effectiveness of empowering patients to take control'[1]. Our synthesis of qualitative and quantitative studies offers insights into these recommendations. HBPM (with or without telehealth) enables patients to take measurements hitherto part of a clinical assessment potentially challenging the dynamics of the patient-professional relationship. HBPM can be used to prove – or challenge – the diagnosis, and enhances the potential for supported self-management. Patients described how monitoring their blood pressure changed their understanding of their condition and empowered them to engage in lifestyle changes and self-management[22,25]. Self-monitoring and titration of medication can reduce blood pressure[59], and is a postulated mode of action in effective telehealth trials[60]. The 'therapeutic alliance' between patient and professional, underpinned by good interpersonal communication skills, were highlighted as crucial in realising the benefits of HBPM.

Our findings of inconsistent outcomes from interventions designed to empower lifestyle and medication adherence change corroborates previous research[61]. Even in a condition such as hypertension, where treatment is (comparatively) straightforward, our qualitative meta-review reveals how patient beliefs vary and influence their adherence, in keeping with the 'perceptions and practicalities model' discussed by Horne et al[62]. The breadth of support interventions described in the PRISMS taxonomy of self-management support – almost all of which were represented in both the quantitative and qualitative meta-reviews – highlights that one size does not fit all. Complex interventions need to be tailored to individuals, their demographic and cultural beliefs as well as clinical context in keeping with the findings of the wider PRISMS meta-review of LTCs[15].

Conclusion:

Our novel synthesis of systematic qualitative and quantitative meta-reviews tells a consistent story. Supported self-management can improve control of blood pressure control. Interventions are complex and encompass a broad range of support strategies. HBPM (with or without telehealth) within the context of a supportive patient/professional partnership helps bridge the gap between medical and lay perspectives of hypertension and enable effective self-management.

Ethics approval: Not applicable: meta-review of published data

Consent for publications: Not applicable: no individual person's data

Availability of data and materials: Not applicable: all data used in this meta-review are derived from published studies and thus already available

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Author contribution: ST and HP initiated the idea for the PRISMS study, led the development of the protocol, securing of funding, study administration, data analysis, interpretation of results and writing of the paper. EE, HLP and GP were systematic reviewers who undertook searching, selection of papers and data extraction of the PRISMS study with ST and HP. DD with GP updated the qualitative synthesis; OS with AS updated the quantitative review. All authors had full access to all the data, and were involved in interpretation of the data. OS and DD with HP wrote the initial draft of the paper with GP, EE, HLP and ST to which all the authors contributed. ST and HP are study guarantors.

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Figures, Tables and Supplementary Digital Content

Figure 1: PRISMA flow diagram of the screening process for the qualitative and quantitative meta-review

Figure 2. Metaphors and sub-themes from the qualitative synthesis; self-management support interventions

Figure 3. Meta-Forest plot of mean difference in BP

Table 1. Synthesis of the qualitative and quantitative findings mapped to the PRISMS taxonomy

Supplementary digital content files.

SDC1 Search, selection, overlap, and quality
SDC2. Qualitative summary and quotes
SDC2. Quantitative summary, mapping and pre-publication check

Figure 1. PRISMA diagram

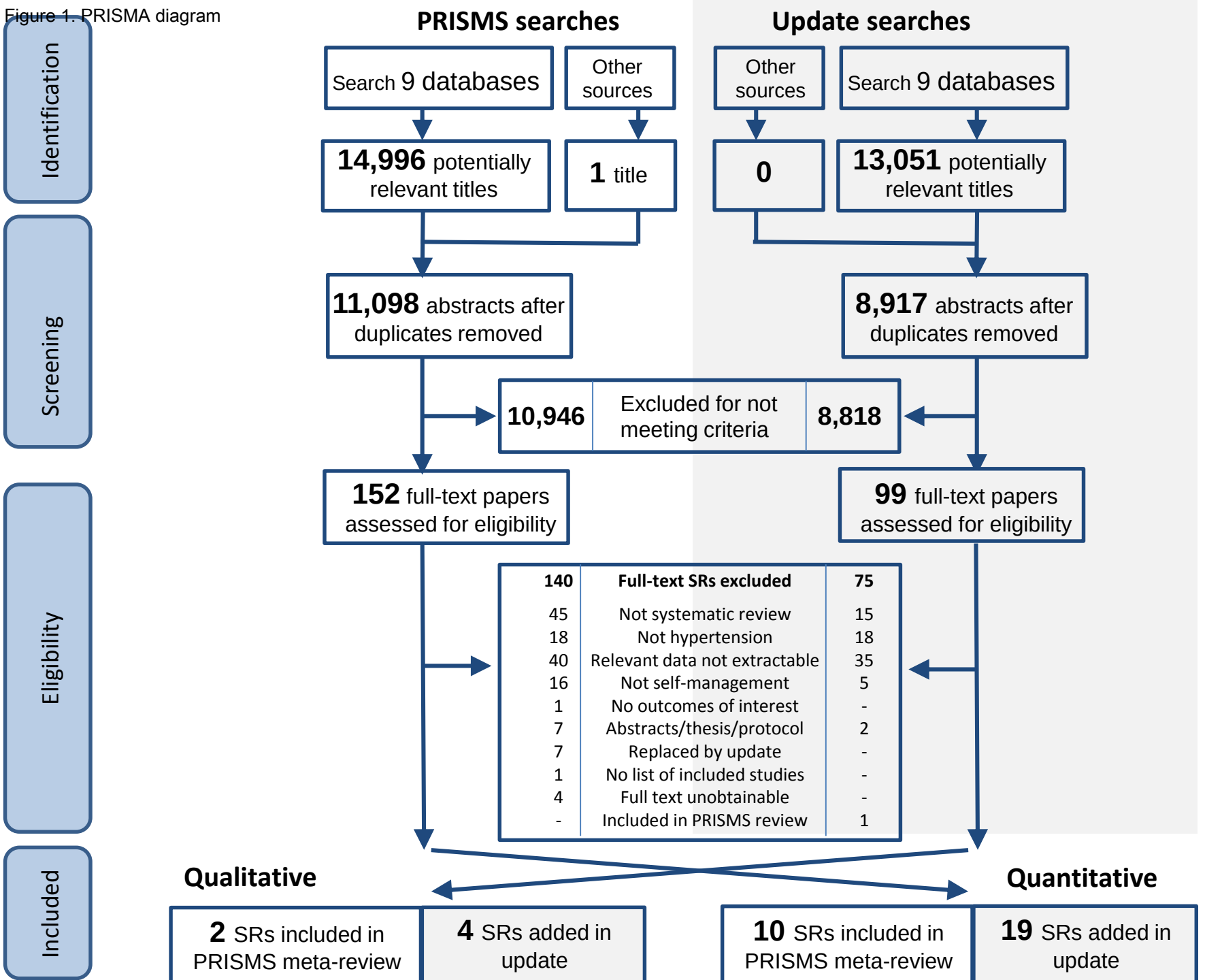


Figure 2. Schema

Figure 2. Metaphors and sub-themes from the qualitative synthesis, mapped to widely used components of self-management support interventions

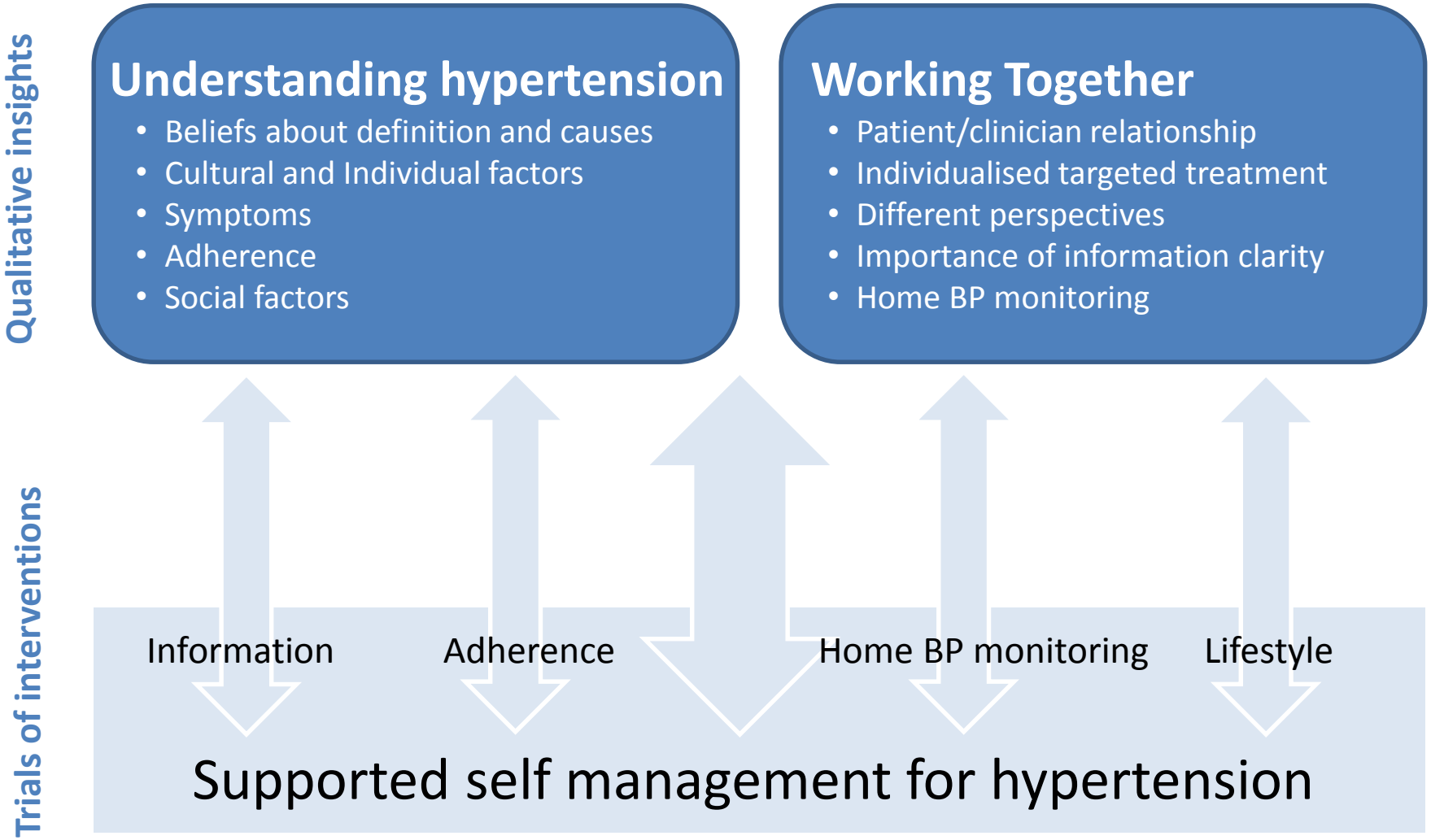
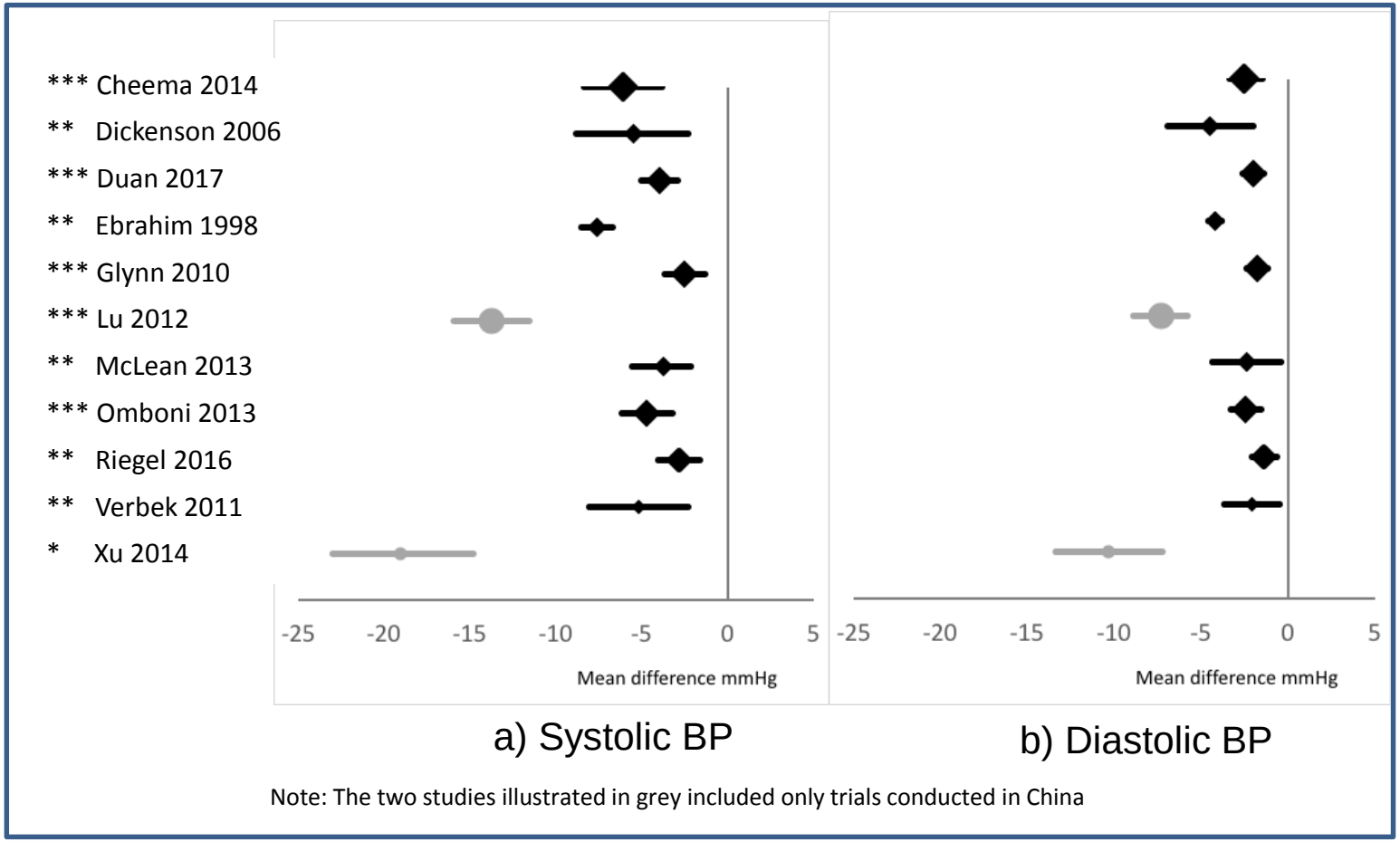


Figure 3. Meta-Forest plots illustrating mean difference in BP



Note: The two studies illustrated in grey included only trials conducted in China

Table

Table 2. Lines of Argument synthesis and components of the quantitative interventions mapped to the PRISMS taxonomy

PRISMS taxonomy	Qualitative review: • **Lines of Argument synthesis**	Quantitative reviews including component in their intervention
A1. Information about condition and /or its management	• Differences in understanding of hypertension need to be considered and addressed when delivering any training and treatment [24] • It is important to address the uncertainty relating to the management and prognosis of hypertension [22-24,26] with clear patient friendly language	27 reviews included information about hypertension and treatment (the remaining two focused on information about lifestyle change [33,47])
A2. Information about available resources		One review included information about community resources [41]
A3. Provision of/agreement on specific clinical action plans and/or rescue medication	Although 'action plans' were not discussed by name, the need for patients to know how to interpret HBPM readings was mentioned [22]	4 reviews mentioned agreement on management plans [28,32,34,53]
A4. Regular clinical review	• Symptoms are commonly reported and should be acknowledged [21,23,26]	9 reviews included regular clinical reviews [37,39,40,42,43,46,49,52,53]
A5. Monitoring of condition with feedback	• Interventions like self-monitoring of BP (HBPM) can foster therapeutic alliance [22] and promote a more internal locus of control	18 reviews included HBPM [27-29,31,32,34-37,41-43,46,48,50,52,53,56] with evidence that feedback (e.g. via telehealth) improved effectiveness [27,29,32,34,37,41,43,52,53,56]
A6. Practical support with adherence (medication or behavioural)	• Adherence, particularly to medication, may be affected by factors including symptom guided use and fear of dependence rather than simply forgetting to take medication [23,24]. It is important to explore and address these issues with patients. • Cultural differences may be important although this remains unclear. Respecting cultural beliefs is considered necessary by some to improve adherence [21] whilst others found the principal themes identified were remarkably similar across cultural and ethnic groups [24]	15 reviews addressed adherence [27,34-37,40,42,44,48,50-54,57]. with varied results. Targeted interventions [38,48] and those involving HBPM [57] maybe be more effective.

A7. Provision of equipment	Although equipment was not specifically discussed, HBPM (which would require a sphygmomanometer) was considered as important.	19 interventions provided HBPM equipment [27-29,31,32,34-37,41-43,46,48,50, 52,53,56,57]
A8. Provision of easy access to advice or support when needed	Telehealth was described as a strategy for providing access to support [22]	6 interventions explicitly enhanced access to support [27,29, 34,38,42,50]
A9. Training/rehearsal to communicate with health care professionals	• Clinicians need to address the underlying concerns of patients and work within the patient's understanding of hypertension rather than 'correcting' their knowledge to a biomedical model [24,26] Patients may have different interpretations regarding the causes of hypertension [21,24,25] and this should be considered. • Mismatch in understanding and management, between the person with hypertension and the healthcare professional, was evident across studies [22-26]. The importance of the therapeutic alliance and need for good interpersonal communication skills is evident.	
A10. Training/ rehearsal for everyday activities		
A11. Training/rehearsal for practical self-management activities	• It is important that both patients and clinicians are clear how to interpret HBPM readings otherwise this may increase anxiety [22]	6 interventions described training in practical self-management strategies [29,40,41,44,45,53]
A12. Training/ rehearsal for psychological strategies		5 interventions described psychological support [28,31,33,48,50]
A13. Social support	• Social and environmental barriers to treatment adherence, including family influences, financial issues, need to be considered when managing people with hypertension [22,23]	5 interventions included social support [27,39,40,48,54]
A14. Lifestyle advice and support	• Access to exercise equipment/facilities, access to healthy food need to be considered when managing people with hypertension[22,23]	Lifestyle support was included in 13 interventions, and was the focus of one review [33]

Condensed Abstract

Our meta-review synthesised the findings of 6 qualitative (98 studies) and 29 quantitative (446 Randomised Controlled Trials) reviews. Self-management support for hypertension consistently reduced blood pressure. Interventions are complex, encompassing support strategies such as information about hypertension/treatment, home BP monitoring (HBPM) and feedback (including telehealth). Patients' perceptions of a disease with multiple symptoms contrasted with the professional view of an asymptomatic condition. HBPM, in the context of a supportive patient-professional relationship, increased patients' understanding of hypertension, potentially bridging the gap between medical and lay perspectives of hypertension and enabling effective self-management.

Abbreviations definitions

BP	Blood pressure
HBPM	Home blood pressure monitoring
LTCs	Long-term conditions
MeSH	Medical subject headings
PICOS	Population, Intervention, Comparator, Outcome, Setting
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PRISMS	Practical systematic Review of Self-Management Support for long-term conditions
RCTs	Randomised Controlled Trials
R-AMSTAR	Revised Assessment of Multiple Systematic Reviews